TONE BUILDING ESSENTIALS

An introduction to guitar tone building (Version 1.0, January 2018)
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Content

Introduction

Achieving a 'good tone' is not an objective procedure, because it is a personal thing.

This document is about the basics that define your guitar tone (or your sound if you like) because it is a combination for various things and in this document I will try to explain these tone contributing issues.

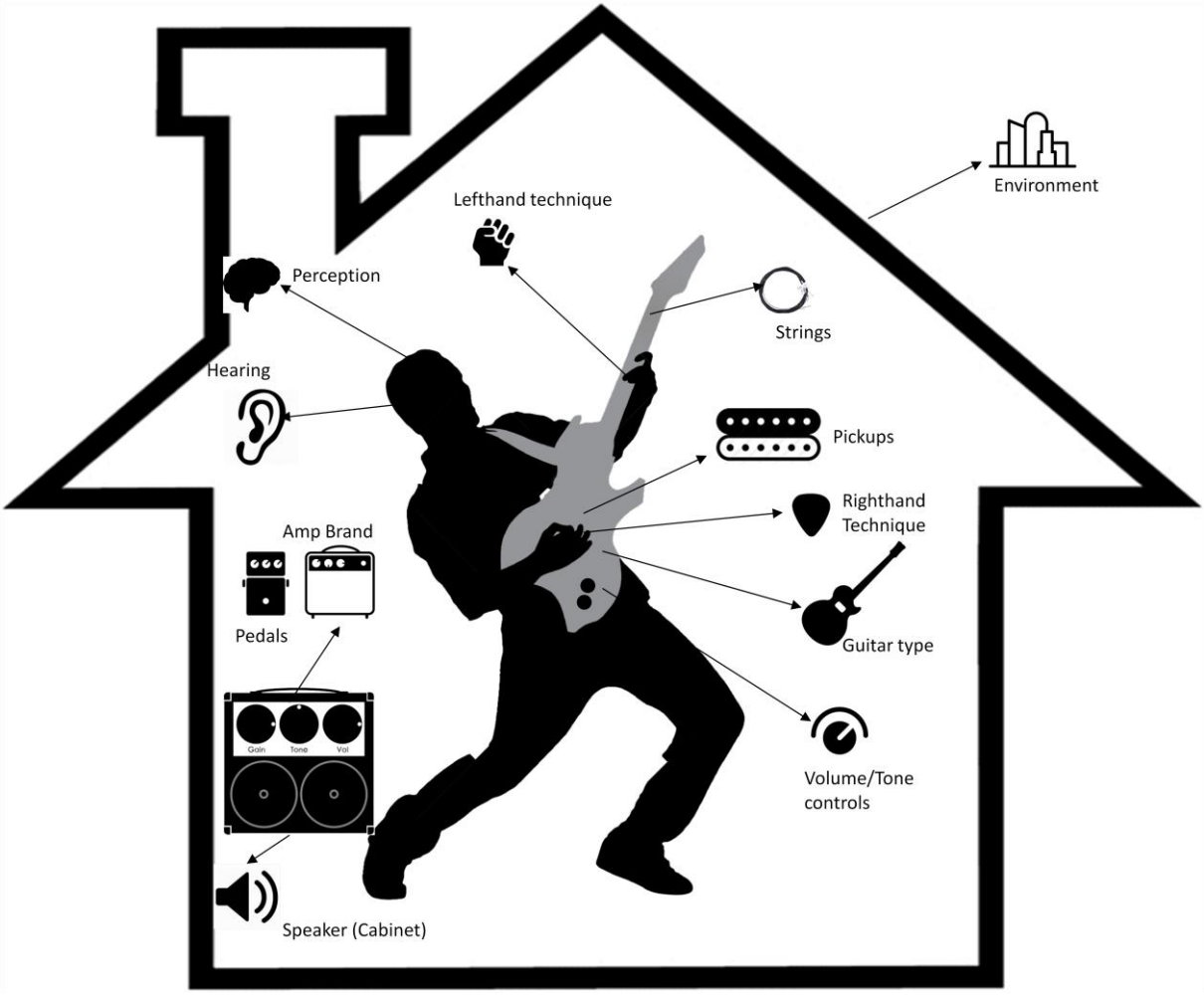
Others guides available from my website:

- Tone building with the Line 6 POD HD PRO
- Guitar effects: what they are and also where you can find them on the Line 6 POD HD
- Recording, Mixing and Mastering in a home studio
- GearTalk: guidelines for selecting amps, speakers and effects and how to use them
- Pedal Guidelines: General tips for setting up various pedals
- Rig Rundown: What do I use, what influenced my choices and how do I use it.

Tone Building Essentials

Overview

A good tone is not something you can define in an objective way. There are multiple factors involved as the picture below illustrates. In this document I will look at these 12 factors in more detail:

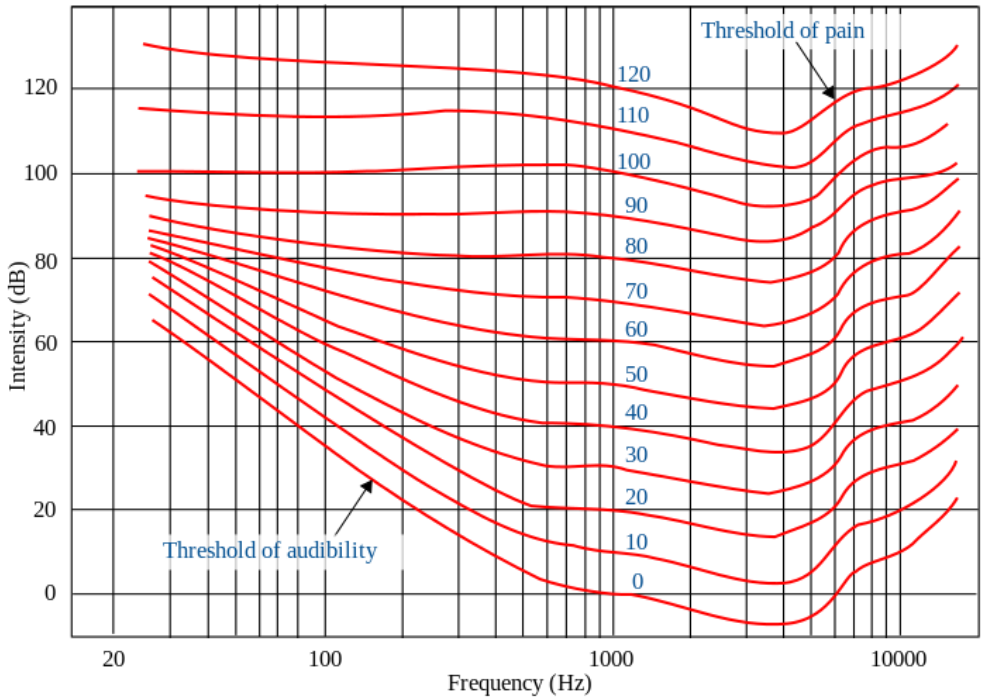


All these tone related issues together will define your tone!

The environment: Where are you?

Tone is influenced by the environment you are in and the associated volume for that environment. If you are playing at home at bedroom volume the tone will be quite different if you would compare it, with the same tonal setting at gig volume.

Without going in too much detail (search the internet for the details) this is about the **Fletcher-Munson Curves**, sometimes known as Equal Loudness Contours, It is basically a graph, that represent how the human ear hears different frequencies as the volume changes.



So if you playing at both low and high volumes you will need to dial-in your sound for both occasions. In general: the louder you play the less bass you need to dial in(see graph) and the less reverb you need to use.

Bottom Line: I you play both at bedroom level and at venues (high volume) add a dedicated graphic EQ at the end of your signal to compensate in those situations. This way you do not have to change your original pedal and amp settings.

The perception: What's on your mind?

The perception of a good tone depends on what you want. A **jazz** guitarist will have complete different mindset of a good tone than a **metal** guitarist.


Jazz Guitarist


Metal Guitarist

Furthermore in the above example it is likely they have quite different guitars, another type of amplifier and not unimportant different EQ settings.

As an example of a mindset consider this: For a jazz tone you will need a clean amp, a fair amount of mid, not too much treble and set the bass according to room acoustics. For typical metal tone you will likely make the tone more hollow, meaning boosting the low and high frequencies and lowering the mids and of course an overdriven amp channel. This shows that what's on your mind defines the basics and in this case you see that the settings are fundamentally different.

Bottom Line: Understanding what you actually want, tone wise, will help you in the right direction.

The hearing: What do you hear?

This is a very subjective issue as what sounds pleasing to you is maybe not you neighbours favourite gone.

Also, you may have heard some gear in a YouTube video and you were absolutely convinced that you needed that and once you bought the gear it sounded quite different and by no means what you expected.

First of all: audio on YouTube is **always compressed** and remember, you do not know what post processing took place, you may have other gear contributing to the tone etc.

Bottom Line: You cannot rely on any review other than it may be informative and attracts your attention, but you need to check it out at your local music shop.

The instrument: What type of guitar are you using?

Basically there are three types of electric guitar bodies:

Solid guitars are made from a solid piece of wood, **semi-hollow** guitars are only partially hollow (most of the time they have acoustic chambers with a piece of wood running down the middle, dividing the inner body into two sections, the acoustic chambers (such as the PRS SE Custom 22). **Hollow** guitars come in two variants: the thin-line (such as the Gibson ES 335) and the archtops, the ultimate jazz guitar (such as the Gibson L-5)

Obviously, a solid electric guitar will sound different than a semi-hollow or hollow guitar. And even within the same category the used wood, the thickness and construction will contribute to the overall tonal characteristics of the instrument (Think about the difference between a Fender Stratocaster and a Gibson Les Paul, both solid-body guitars)

As a rule of thumb guitar styles are roughly related to musical genres (but not exclusive):

- Full-hollow body jazz guitars are good for jazz especially with flatwound strings. They have a warm, soft sound, with smooth attack and react fast enough response to play melody lines. Thin line models are also leaning a bit towards jazz, but can also work well in blues with a slightly overdriven amp.
- Semi hollow guitars are mostly associated with blues
- The Telecaster (and associated models) have, due to the single coil elements, a special twang that belongs to country music, although this guitar is also used (with an overdriven amp) for rock and blues
- The Stratocaster is associated with rock'n'roll, but is also suitable for (hard) rock and blues
- The super strats, such as the ones made by Ibanez, PRS, Jackson etc, are typically associated with metal and other technical styles such as fusion.
- The Les Paul style fits more naturally in jazz and fusion than the Fender models. With the humbuckers pickups it is also a blues candidate and good for (blues)rock.

Now about the used wood: The discussion about the influence of wood on the sound of a electric guitar is huge. I wouldn't go into the detail, just search for **tonewood for electric guitars** and you will find these discussions. From my personal experience I think the influence of wood on the tone is far less than the choice of pickup's. From an aesthetic point of view, you may prefer certain types of wood.

A specific issue here is how the neck is attached to the body: set-neck (glued) or bolt-on (screwed). A set-neck construction (such as Gibson Les Paul) transfers the resonance between neck and body more freely and direct, the result is a little more warmth and fullness. In case of a bolt-on (such as Fender Stratocaster) a little more snap and twang.


Bolt-on Neck


Set Neck

As said, the type of pickup's will influence the sound as the next chapter will show.

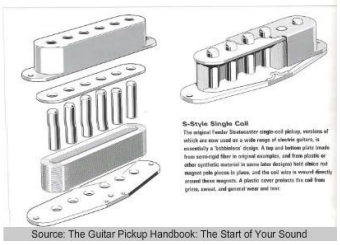
Bottom line: The choice of a guitar is closely related to what type of music you intent to play and some guitar types will fit a genre better than others

The pickups: What are you using

Pickups are one of the key ingredients of a guitar tone. And the nice thing about pickups are you can exchange them with others to customize your sound.

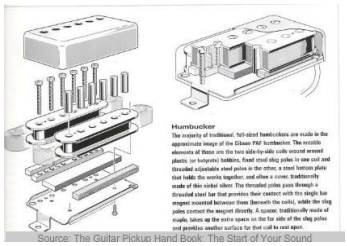
Pickups translate a string's vibration (what you play) into an electrical signal that you can send through an amp. In order to hear the final result, you need a speaker to convert the electrical signal back into an audible sound.

If we talk about the types of pickups the two basic types, **single coils** and **humbuckers**.



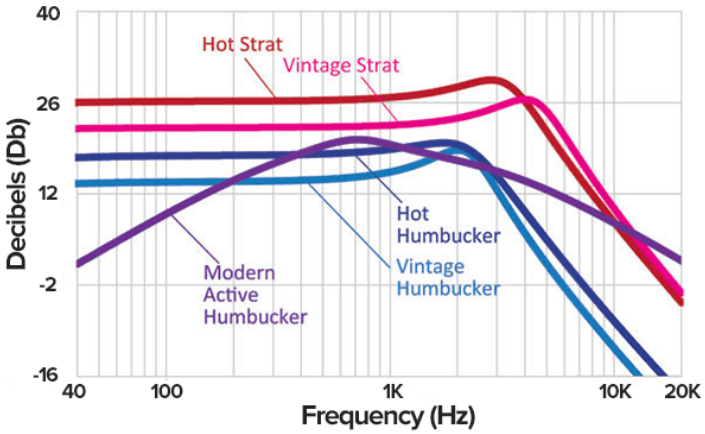
Source: The Guitar Pickup Handbook: The Start of Your Sound

All magnetic pickups house a coil of wire wrapped thousands of times around a bobbin or coil-former. Single-coil pickups have one of these structures, and double-coils have two of them. All pickups were single-coil until 1955. Single-coil pickups sound great, but they can be noisy, transmitting electrical hum and buzz along with the sound of the strings.



Source: The Guitar Pickup Hand Book: The Start of Your Sound

A humbucker combines two single-coil structures into one pickup, wiring them out of phase and with their magnetic poles oriented in opposite directions, cancelled-or "bucked"-electrical hum.The term "humbucker" has become the standard name for any pickup that pairs two coils to reduce unwanted noise. Almost all double-coil pickups are humbuckers, though they are sometimes wired to provide the option of humbucking and non-humbucking operation (coil split).



In general the pickups resemble a certain frequency response:
Without going into too much detail (search the internet) it is clear that pickup's have a serious impact on your tone, so check out these differences and see what you like.

Whatever pickup's you have, single coils, humbuckers or a combination in most cases you have at least two pickups one close to the bridge and one close to the neck. You will notice that, even with the same pickups there is a distinct tonal difference. That is also the reason why some guitarist prefer specific pickups at these positions.

Bottom Line: Single-coils tend to be clear and bright and humbuckers tend to be thick and/or fatter and bridge pickup will sound brighter where the neck pickup will sound darker.

Last but not least: there is a huge tonal difference in using the neck pickup, the bridge pickup or both.

Bottom line: The bridge pickup will sound sharper than the neck pickup which has a more mellow tone.

The strings: What strings are you using?

The strings on your electric guitar have a major impact on the sound and playability. Strings are manufactured in a range of thicknesses(or gauges). These gauges are designated in thousandths of an inch. The lightest strings are typically an .008 (often referred to by guitarists as an “eight”) and the heaviest a .56 (or fifty-six). String gauge has a big influence on playability and sound.

Lighter gauge strings:

- are generally easier to play
- allow easier bending of notes and fretting
- break more easily (although this heavily depends on your playing technique)
- produce less volume and sustain
- are prone to cause fret buzzing, especially on guitars with low action
- exert less tension on the guitar neck and are a safe choice for vintage guitars

Heavier gauge strings:

- are generally harder to play
- require more finger pressure to fret and bend notes
- produce more volume and sustain
- are preferred for low tunings such as drop D
- exert more tension on the guitar neck

Bottom line: The type and gauge of strings will definitely influence your tone, so try different brands and gauges.

The left hand technique: How do you play?

Typical left hand issues are finger independence to make switching between chords easier, and play legato (fluid) with hammer-on’s and pull-offs and to strengthen your left hand. But also string bending is a left-hand task.

Also the position where to place your fingers on the fretboard will influence tone, the closer to the fret the more percussive, sharper and cleaner the tone will be.

Bottom line: Although the general advice is fret the notes close to the fret, you might want to experiment with the left hand settings and decide what works best for you.

The right hand technique: How you hit the strings?

Also of significant importance is your right hand technique. **How** do you hit the strings(hard or gentle?), **what** do you use (fingers or pick?) and **where** do you hit the stings (close to the bridge of close to the neck?)

If you use your fingers you will notice that the sound is not only softer, but you will also have more control over the sound as you can use various technique. If you are using a pick than these options are less prominent, but do experience with the angle of the pick, you'll be surprised.

If we talk about picks, the thickness will also impact your tone. Thicker picks have greater mass, which means more volume. On the other hand, thinner picks have a smoother feel and tend to have a naturally sharper attack with a brighter feel. Also picks that have a sharp point tend to sound brighter while those with rounder points have a softer tone. The material is less important than the thickness.

Bottom line: Picking harder results in a brighter sound, while picking softer results in a warmer sound and a thick pick will be more percussive then a thin one

But also **where** you hit the strings will have a huge impact on your sound, the closer to the bridge the more 'twang' you will hear. Opposite, hitting the string close to the neck will result in a warmer jazzier tone.

The controls: How do you use them?

Most electric guitars come with one or more controls for volume and tone. There are basically two types of these potentiometers linear for tone and logarithm for volume.

In linear pots, the changes follow a direct pattern. If you turn it halfway, its resistance will be halfway between its minimum and maximum settings. Volume controls have to cater to the human ear, which isn't linear. Logarithmic pots increase their resistance in a curve.

A **volume control** pot is a variable resistor. As you turn it, the resistance changes, allowing more or less of the signal through.

250K control pots are the usual choice for single coil pickups.
500K control pots are the usual choice for humbuckers.

These "K" numbers are the resistance ratings (kOhms). K is the abbreviation for Kilo, or 1,000. 1Meg-ohm is 1,000K, or 1-million ohms.

You can experiment with different pots on your guitar: higher values produce a slightly brighter tone. Lower values produce a slightly warmer tone (they remove little more of the highs).

1Meg-ohm pots are the brightest sounding.
25K pots are for active systems with battery-powered preamps.

(source: www.stewmac.com)

A **tone control** pot lets some of your guitar's high frequencies escape to ground instead of getting to the amp, therefore turning the tone port counter clockwise the highs are being cut off and the sound gets darker. Switching from 250K to 500K pots will mean a brighter sound.

I know a lot of guitarists leave both controls wide open and let the full signal pass. Personally I often vary with the volume control as it allows me the easily control how hard my overdrive pedal(or amp for that matter) is pushed. This allows me to quickly increase or decrease the gain. I use the tone control for getting a warmer tone if I need it.

Using the volume control has, in some cases, an unwanted side effect: The potentiometer's resistance is muffling your signal when the volume is decreased. This is called **treble bleed**.

But there is a rather simple solution:

The remedy for this is to install a **capacitor**. The standard practice is to build in a 220 pF capacitor between the potentiometer's input and output terminals; that is, solder one wire to the lug that goes to the pickup or pickup selector and the other to the lug leading to the output jack. This is a shortcut for the high frequencies to bypass the pot and go directly to the output.

As capacitors are very cheap and it is beneficiary to buy capacitors with different ratings and experiment what works best for you.

Bottom Line: Volume and tone controls can alter you tone significantly and you should experiment with various settings.

The amp: What brand are you using?

In my GearTalk document I already explained the differences/similarities of amp types (combo's head's, tubes, solid state and more). In this tone building document is it about brands, because a brand usually stands for a typical sound. That's why there a people that love the Fender sound while other believe a Marshall sounds the best. So there is no such thing as the best guitar amplifier.

I will try to characterise some major brands(and I am sure I'll forget some important ones):

- **Fender** is known for their clean sounds, can do some overdrive but have a problem with heavy distortion and that is why you will often need an overdrive/distortion pedals for lead tones. (Alternatives: Dumble, VOX, Supro)
- **Marshall** has reasonable clean tones and iconic overdrive sounds. If you like rock music, your heroes probably play Marshalls. (alternatives: Orange, Peavey)
- **Mesa** has interesting characteristics from heavy-metal through cleans and blues tones, depending on the different amplifier models. Depending on what you intend to play take a look at alternatives such as Blackstar, Soldano etc)
- **ENGL** is typical associated with metal and hard-rock. These amps are aimed at very high sounds, do not expect to get a nice clean tone (although there is a way to get close) alternatives come from Bogner, Diezel, Peavey and others.
- **DR. Z** is a fair choice if you intend to get your tone from pedals. These type of amps are so called pedal friendly, they have a lot of headroom and not much gain. Alternative brands are Hampstead, Wampler, Fender, Peavey, Two rock, Victory.

As you notice there are brands out there that have amp models in various categories and also there are specific amp models that fit into different categories due to fact they have multiple, different voiced, channels.

Bottom Line: There is so much to choose from. As a starting point you could make a fundamental decision: Do I want the tone to come from my amp or will I use pedals? I you take the pedal road you are best served by an amp with a lot of headroom such as the Fender of Dr.Z type of amps. If you want the amp to do the job (mostly) look for the other brands.

The pedals: What are you using?

Pedals can make or break your sound. I you intend to go the pedal-way make sure the pedals 'like' each other. In other words make the pedals a good pairing especially if you intend to use **gain staging** technique, where the first overdrive is 'feeding' the second one. If this results in a mess, you might consider to run these pedals in **parallel** rather than **serial**. The same goes for delay and reverb. To me these effects do a better job when used in parallel mode.

As a rule of thumb: Use **tone shaping** pedals such as overdrive, distortion, wah, ect before the amp and modulation(or time based effects) such as chorus, flanger, phaser, delay and reverb) in the effects loop of the amp.

Last tip: invest in a good pedal power supply with **isolated** power such as the ones from Voodoo lab, Truetone and Cioks. Don't go the cheap way with daisy chains (see the GearTalk document for more details on this subject).

Bottom line: Try out the pedals you intend to use with your own (type) of amp, a pedal may sound good with one amp and very poor with another.

The speaker: What type of speaker and cabinet are you using?

This chapter covers two issues: The cabinet itself and the speaker(s).

Anyone with authority will tell you that the speakers are responsible for a large portion of the final tone. Replacing a standard speaker with a different type can instantly alter your sound.

Typically, certain types of speaker cabinets perform better with certain styles of music, for rock related music a **closed-back** cabinet is probably the classic choice, whole an **open-back** cabinet is more appropriate for jazz or blues and the sound id less mid heavy and has a more sparkling sound.

As starting point I would go for a 2×12" speaker cabinet because two 12" speakers are ideal for the electric guitar, the tone is balanced and classic. Examples of open 2x12" cabinets are the Vox AC30, Marshall Bluesbreaker, and the Fender Twin). Typical closed back cabinets examples are: Orange PPC212, Hughes & Kettner TM 212 and Mesa Boogie Rectifier Horizontal 2x12.

Don't forget to check out the open and closed versions.

The most famous image of a guitar speaker cabinet is undoubtedly the 4×12", but you will only need that if you are using >100 Watt Poweramp.

Bottom line: Try as many cabinets and speakers as you can and decide what is best for you.